

**DEPARTMENT OF INSTRUMENTATION AND CONTROL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI**

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech		
Course Title	ASSISTIVE DEVICES		
Course Code	ICPE20	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session		Section (if, applicable)	A and B
Name of Faculty	Dr. P.A Karthick	Department	ICE
Official Email	pakarthick@nitt.edu	Telephone No.	-
Name of Course Coordinator(s) (if, applicable)	NA		
Official E-mail	NA	Telephone No.	NA
Course Type (please tick appropriately)	Elective		
Syllabus (approved in BoS)			
<p>Introduction to the Human body system, Principles of Assistive and Rehabilitation Technology, Design considerations, standards and key approaches to rehabilitation and Assistive Technology.</p> <p>Assistive Devices for Persons with Engineering Heart and Circulatory problem - Anatomy of Heart and circulatory system, Heart Assist Technology- Blood Pumps and Prosthetic Heart Valves.</p> <p>Assistive Devices for Persons with Visual Impairments - Anatomy of eye, Categories of visual impairment – Cortical and retinal implants, Blind mobility aids –reading writing - graphics access and Braille Reader, Tactile devices for visually challenged, Text to voice converter, Orientation and navigation Aids –Ultra sonic canes and laser canes.</p> <p>Assistive Devices for Persons with Hearing Impairments - Anatomy of ear -hearing functional assessment, Types of deafness, Hearing aids- Cochlear implants, Assistive technology for hearing Tactile -Information Display- Voice synthesizer and speech trainer.</p> <p>Anatomy of upper and lower extremities, Classification of amputation types, Prosthesis prescription - Components of upper and lower limb prosthesis, Different types of models for limb prosthetics- Body powered prosthetics- Myoelectric controlled prosthetics and Externally powered limb prosthetics. Functional Electrical Stimulation Systems-Restoration of hand function, restoration of standing and walking, Hybrid Assistive Systems (HAS).</p>			

Concepts of Manipulation and mobility Aids, Grabbers, feeders, and page turners, Classification of manual and special purpose wheelchairs -Manual wheelchairs –Electric power wheel chairs -Power assisted wheel chairs -Wheel chair standards & tests, sports and racing wheel chairs.

Text Books:

1. Albert M. Cook and Janice M. Polgar, Assistive Technologies Principles and Practice, 4th Edition, Elsevier, 2015.
2. Cooper Rory A, An Introduction to Rehabilitation, Taylor and Francis, London, 2012
3. Joseph D. Bronzino, Handbook of Biomedical Engineering, 2nd Edition –Volume II, CRC press, 2010
4. Muzumdar A, Powered Upper Limb Prostheses – Control, Implementation and Clinical Application, Springer, 2004.
5. Cook A.M. and Hussey S.M., Assistive Technologies: Principles and Practice, Mosby, USA, 1995.

Reference Books

1. Teodorescu H.L.and Jain L.C., Intelligent systems and technologies in rehabilitation engineering, CRC Press, 2001.
2. Warren E. Finn, Peter G. LoPresti, Handbook of Neuroprosthetic Methods, CRC; edition 2002.
3. Rory A Cooper, Hisaichi Ohnabe, Douglas A. Hobson, “An Introduction to Rehabilitation Engineering”, CRC Press, 2006.
4. Marion A Hersh, Michael A, Johnson, Assistive Technology for Visually impaired and blind people”, Springer Publications, 1st Edition, 2008.
5. Albert M. Cook, Janice Miller Polgar, Essentials of Assistive Technologies, Elsevier 2012.
6. Roberto Manduchi, Sri Kurniawan, Assistive Technology for Blindness and Low Vision, 1st Edition, CRC Press, 2017..

COURSE OBJECTIVES

1. To understand the concepts of various rehabilitation equipments for human movements and applications
2. To understand and gain knowledge about different hearing aids
3. To study various assist devices for visually and auditory impaired
4. To study the various orthotic devices and prosthetic devices to overcome orthopedic problems
5. Understand the various mobility aids
6. Learn about manual and powered wheelchairs for the evaluation of human-technology interfaces
7. Understand key terminology used by various aids within the disability community and its roles.

Course Outcomes

1. Gain adequate fundamental knowledge about the needs of rehabilitations and its future development.
2. Design and apply different types of Hearing aids, visual aids and their application in biomedical field and hence the benefit of the society.
3. Gain in-depth knowledge about various assistive technologies for vision and hearing.
4. Develop and Compare the different methods of orthopedic prosthetics for rehabilitation.
5. Select the appropriate rehabilitation concept for various disabilities.
6. Apply basic design and analytical skills to model various types of Wheel Chairs for varied needs.

MAPPING OF COs with POs	
Course Outcomes On completion of this course, the students will be able to	Programme Outcomes (PO) (Enter Numbers only)
1. Gain adequate fundamental knowledge about the needs of rehabilitations and its future development.	1,2,3,4,5,6,7,8,9,10,11,12
2. Design and apply different types of Hearing aids, visual aids and their application in biomedical field and hence the benefit of the society.	1,2,3,4,5,6,7,8,9,10,11,12
3. Gain in-depth knowledge about various assistive technologies for vision and hearing.	1,2,3,4,5,6,7,8,9,10,11,12
4. Develop and Compare the different methods of orthopedic prosthetics for rehabilitation.	1,2,3, 12
5. Select the appropriate rehabilitation concept for various disabilities.	1,2,3,4,5,6,7,8,9,10,11,12
6. Apply basic design and analytical skills to model various types of Wheel Chairs for varied needs.	1,2,3,4,5,6,7,8,9,10,11,12

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	3	3	3	3	2	1	2	2	3	3	3	1
CO2	3	3	3	2	3	3	3	2	2	2	2	3	3	3	2
CO3	3	2	3	-	-	-	-	-	-	-	-	2	3	3	-
CO4	3	2	3	2	3	2	2	1	1	2	2	3	3	3	1
CO5	3	2	3	2	3	2	2	1	1	2	2	3	3	3	1
CO6	3	2	3	2	3	2	2	1	1	2	2	3	3	3	1

COURSE PLAN – PART II			
COURSE OVERVIEW			
The course provides a detailed overview on various assistive devices namely,artificial eye, and lower and upper limb prosthesis etc.			
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week/Cont act Hours	Topic	Mode of Delivery
1	1 st week to 3 th week	Introduction to the Human body system, Principles of Assistive and Rehabilitation Technology, Design considerations, standards and key approaches to	Black/ White Board, and Power point presentation

		rehabilitation and Assistive Technology. Assistive Devices for Persons with Engineering Heart and Circulatory problem - Anatomy of Heart and circulatory system, Heart Assist Technology- Blood Pumps and Prosthetic Heart Valves.	
2	4 th week to 5 th week	Assistive Devices for Persons with Visual Impairments - Anatomy of eye, Categories of visual impairment – Cortical and retinal implants, Blind mobility aids –Orientation and navigation Aids – Ultra sonic canes and laser canes.	Black/ White Board, and Power point presentation
3	5 th week to 8 th week	Assistive Devices for Persons with Hearing Impairments - Anatomy of ear -hearing functional assessment, Types of deafness, Hearing aids-Cochlear implants, Assistive technology for hearing Tactile -Information Display- Voice synthesizer and speech trainer.	Black/ White Board, and Power point presentation
4	8 th week to 10 th week	Anatomy of upper and lower extremities, Classification of amputation types, Prosthesis prescription - Components of upper and lower limb prosthesis, Different types of models for limb prosthetics- Body powered prosthetics- Myoelectric controlled prosthetics and Externally powered limb prosthetics. Functional Electrical Stimulation Systems-Restoration of hand function, restoration of standing and walking, Hybrid Assistive Systems (HAS).	Black/ White Board, and Power point presentation
5	10 th week to 13 th week	Concepts of Manipulation and mobility Aids, Grabbers, feeders, and page turners, Classification of manual and special purpose wheelchairs - Manual wheelchairs –Electric power wheel chairs - Power assisted wheel chairs -Wheel chair standards & tests, sports and racing wheel chairs.	Black/ White Board, and Power point presentation

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Continuous Assessment 1 Quiz	-	1 Hour	20
2	Continuous Assessment 2 Quiz	-	1 Hour	20
3	AssignmentSs	-		20
4	Final Assessment -Written Exam	-	2 Hours	40

COURSE EXIT SURVEY

- Written feedback from students
- Students' performance in tests

COURSE POLICY (including compensation assessment to be specified)

COMPENSATION ASSESSMENT : Compensation assessment will be conducted for students who miss Assessment 1 or Assessment 2. Students should get permission from the faculty by giving valid reason in written form to write compensation assessment.

REASSESSMENT:

- Refer to B. Tech Regulations B.10.1 and B.12

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory. A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

- Students can meet anytime depends on the mutual availability
- Course Faculty will be available in the Room no 316, Lyceum Building

FOR APPROVAL

Course Faculty P. A. Q. H. C. CC- Chairperson [Signature] HOD [Signature]